REMARKS

Claims 129, 130, 132-151, 155-176, and 180-186 are presented for examination in this application. Claims 34-36, 38-42, and 69-122 were previously withdrawn from consideration by restriction requirement. Claims 1-33, 37, 43-68, 123-128, 131, 152-154, and 177-179 have been canceled, either currently or previously, without prejudice or disclaimer of subject matter. Claims 129, 130, 132-134, 148-150, 156, 158, 173, 181 and 184 have been amended to define still more clearly what Applicant regards as his invention. Of the claims under consideration, Claims 129, 133, 156, 158, 181, and 184 are independent claims.

Claims 129-186 were rejected under 345 U.S.C. § 102(e) as being anticipated by U.S. Patent 5,745,121 (*Politis*).

Claim 129 is directed to a method of creating a pixel image. The pixel image is formed by rendering and compositing a plurality of graphical objects according to an expression tree representing a compositing expression for the image. The expression tree comprises a plurality of nodes each representing one of the objects or a compositing operation for combining graphical objects or results of other compositing operations. Each of the graphical objects have a predetermined object outline comprising a plurality of pixels therein.

An active region is determined for each of the graphical object nodes, each of the active regions being defined by at least one active region outline comprising at least a portion of the predetermined object outline for the graphical object represented by the particular graphical object node, such that the active region of a particular graphical object is wholly within the particular graphical object. An active region is determined for each of

the compositing operation nodes. The active region for a particular compositing operation node is equal to the intersection of the active regions of each child node of the particular compositing operation node.

A clip region is determined for each of the compositing operation nodes. The clip region for a particular compositing operation node is equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node. An effective region is determined for each of the compositing operation nodes, the effective region for a particular compositing operation node being equal to the intersection of the clip region of the particular compositing operation node and the active regions defined by the active region outlines of the child nodes of the particular compositing operation node.

The compositing operation represented by each operation node is applied to the pixels falling wholly within the corresponding effective region for the operation node to create the image. Pixels falling outside the effective regions determined for the expression tree remain uncomposited in creating the image and the structure of the expression tree remains unchanged.

As described at page 24, lines 1-8, of the present specification[1], to avoid unnecessary pixel operations, each sub-expression needs to be clipped to the intersection of the active regions of each expression in which it appears. Therefore, the clipping region of a sub-expression is determined as the intersection of the active regions of all of the (sub) expressions in which it appears. Further, as described at page 24, lines 8-14, of the present

[1]It is of course to be understood that the references to various portions of the present application are by way of illustration and example only, and that the claims are not limited by the details shown in the portions referred to.

specification, the clipping region for each sub-expression in a compositing expression can be calculated by recursively setting the clipping region of each sub-expression to the intersection of its active region and its parent's clipping region. Still further, as described at page 15, lines 29-32, of the present specification, the clipping region of each sub-expression represents the region in which the pixels in the sub-expression contribute to the final displayed image. Furthermore, as described at page 17, lines 13-15, of the present specification, each clip region represents a minimum region in which each sub-expression associated with the corresponding compositing operation contributes to the image.

As described at page 20, lines 13-15, of the present specification, the method uses active region analysis to avoid redundant pixel operations by clipping operations to the regions in which both of their operands are available. Further, as described at page 28 lines 25-29, of the present specification, the effective regions for each node in an expression tree representing the image are calculated by setting the effective region to the intersection of the active regions of the node's operands and the node's clipping region, if the node is an operation node.

At pages 2-3 of the Office Action, the Examiner states that the overlapping part of the circles of Fig. 4 of *Politis* correspond to the "active region that Applicant claims, and it is similar to effective and clipping regions as Applicant discloses on page 34 in the last paragraph and on page 35 lines 1-7 of remarks." However, as described at page 24, lines 22-23, of the present specification, the effective region of an operation is generally not the same as the clipping region of the sub-expression that the operation forms the root thereof. The effective region is usually a proper subset of the clipping region of the sub-expression that it is the root of.

In addition, even if, for the sake of argument, the overlapping part of the circles of Fig. 4 of *Politis* be deemed to represent active regions as claimed by the Applicant (which, in any event, is not admitted as being the case), Applicant submits that the overlapping part of the circles of Fig. 4, and *Politis* in general, do not teach or even suggest "the clip region for a particular compositing operation node being equal to the intersection of the active region of the particular compositing operation node and <u>the clip region of a parent compositing operation node</u> of the particular compositing operation node", as recited in Claim 129. (Emphasis added.) At most, Fig. 4 of *Politis* merely discusses determining the intersection of two active regions.

In any event, Applicant submits that Fig. 4 of *Politis*, and *Politis* in general, do not teach or even suggest "determining an active region <u>for each of the graphical object nodes</u>, each of the active regions being defined by at least one active region outline comprising at least a portion of the predetermined object outline for the graphical object represented by the particular graphical object node, such that the active region of a particular graphical object <u>is wholly within</u> the particular graphical object", as recited in Claim 129. (Emphasis Added.)

Politis states, at column 6, lines 40-41, that "[a]ny pixel outside the boundary of a graphical element is treated as being fully transparent." However, in contrast to the present invention, *Politis* then states that "[f]or each of the leaf nodes 28-32," (i.e., the claimed graphical object nodes), "the bounding box of the graphical element which is to be rendered is first calculated" (see *Politis* at column 13, lines 56-58). *Politis* does not teach or suggest that an active region (and associated active region outline) for each of the graphical object nodes is determined. Applicant again submits that a

bounding box is only an approximation to the outline of an object. For example, the bounding box 31 for the circle of Fig. 17 is only an approximation to the outline of the circle. The outline of the bounding box 32 of the circle does not comprise at least a portion of the predetermined object outline for the circle (i.e., the graphical object) represented by the particular leaf node (i.e., graphical object node).

In fact, *Politis* does not teach or even suggest the determination of "an active region for each of the compositing operation nodes" (emphasis added), as recited in Claim 129 (i.e., using pixels *wholly within* a graphical object). Rather, *Politis* discusses that the bounding box process involves determining a combined bounding box of two graphical elements with the size of the combined bounding box being determined by the combined resultant area using the operators of Fig. 4.

For similar reasons to those discussed above, Applicant also submits that *Politis* does not teach or even suggest "determining a clip region for each of the compositing operation nodes, the clip region for a particular compositing operation node being equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node" (emphasis added), as recited in Claim 129, since *Politis* does not teach or even suggest the determination of "an active region for each of the compositing operation nodes", as also recited in Claim 129 (i.e., using pixels wholly within a graphical object).

In making the rejection under 35 U.S.C. § 102(e), the Office Action states (at page 4 of the Office Action) that a "person skilled in that art could see the similarity in fig. 22 of the reference [*Politis*] to the Applicant claim languages, 'Determining a clip

region for each of the compositing operations, the clip region for a particular compositing operation being equal to the intersection of the active region of the particular compositing operation and the clip region of a parent compositing operation the particular compositing operation'." However, Applicant disagrees for the following reasons.

Fig. 22 of *Politis* shows a method of combining two graphical elements. As discussed at column 15, lines 42-45, of that patent, the desired operation to be performed to the two graphical elements is "square in circle". As stated at column 15, lines 53-57, of that patent, "the graphical element 60 is immediately clipped against the borders of graphical element 61 to produce the final output 64."

Applicant submits that Fig. 22 of *Politis* and the discussion in *Politis* relating to Fig. 22, does not teach or even suggest "determining a clip region for each of the compositing operation nodes", as recited in Claim 129. In contrast, Pol*itis* states that "[i]f a graphic element is utilized as the left operand of an 'in' operation, with an opaque graphical element being the right operand, then clipping involves selecting the visible parts of the left hand operand and only compositing them" (see *Politis* at column 15, lines 62-66). Then at column 16, lines 43-48 of *Politis*, *Politis* states that "the expression tree 65 of Fig. 23 is first processed to locate all cases where a graphical element is clipped against an opaque graphical element utilising an 'in' or 'out' operator..." It is also stated in *Politis* that "[i]n each case, this is replaced by a special node indicator 69 and the boundaries of the clipping object are placed in a separate clip list..." It is further stated in *Politis* that "[w]hen the render list is generated, the 'clip' instructions required for the generation of each graphical element that has been converted to a clip and stored in the clip list are generated before that element is used (see column 17, lines 19-24).

Applicant submits that Fig. 22 of *Politis* does not teach or even suggest "determining a clip region for each of the compositing operation nodes, the clip region for a particular compositing operation node being equal to the intersection of the active region of the particular compositing operation node and the clip region of a parent compositing operation node of the particular compositing operation node", as recited in Claim 129 (emphasis added). Further, Applicant submits that Fig. 22 of *Politis*, and *Politis* in general, do not teach or even suggest "determining an effective region for each of the compositing operation nodes, the effective region for a particular compositing operation node being equal to the intersection of the clip region of the particular compositing operation node and the active regions defined by the active region outlines of the child nodes of the particular compositing operation node", as recited in Claim 129. The present specification describes, at page 28, lines 25-29 that the effective regions for each node in an expression tree representing the image are calculated by setting the effective region to the intersection of the active regions of the node's operands and the node's clipping region, if the node is an operation node.

Applicant further submits that Fig. 22 of *Politis*, and *Politis* in general, do not teach or even suggest "applying the compositing operations represented by each operation node to the pixels falling wholly within the corresponding effective regions for the operation node to create the image, wherein pixels falling outside the effective regions determined for the expression tree remain uncomposited in creating the image and the structure of the expression tree remains unchanged", as recited in Claim 129. These features of Claim 129 reduce the amount of work done by a rendering apparatus by calculating for each compositing operation in an expression to be rendered, the smallest

region of the page in which the operation needs to be performed. Accordingly, the number of pixel operations needed to evaluate a given compositing expression can be minimized.

In contrast, at columns 13-15 of *Politis*, *Politis* discusses that bounding boxes are combined using compositing operations. Therefore, *Politis* discusses that some pixels which are outside the actual outline (or boundaries) of an object and which are considered fully transparent, are composited, and thus, Applicant submits that *Politis* teaches away from the feature of Claim 129 that "pixels falling outside the effective regions determined for the expression tree remain uncomposited in creating the image."

Claim 1 recites the feature in which "the structure of the expression tree remains unchanged." For example, Fig. 5 of the present specification shows an expression tree in which the expression for the active region is shown next to each level. Fig. 8 shows an optimal level activation table for the expression tree of Fig. 5, following the determination of the claimed effective regions for the expression tree of Fig. 5. As seen by a comparison of Figs. 5 and 8, the structure of the expression of Fig. 5 does not change in determining the effective regions for the expression tree. In contrast, *Politis* states that "those portions of the expression tree whose bounding boxes have been minimized to be null, can be deleted from the expression tree" (see column 18, lines 1-6). Accordingly, again, Applicant submits that *Politis* teaches away from the features of Claim 129, and, particularly, teaches away from the feature of Claim 129 in which "the structure of the expression tree remains unchanged."

For at least the foregoing reasons, Applicant submits that Claim 129 is clearly allowable over *Politis*.

Independent Claims 133, 156, 158, 181, and 184 recite features similar in many relevant respects to those discussed above with respect to Claim 129, and therefore are also believed to be patentable over *Politis* for at least the reasons discussed above.

A review of the other art of record has failed to reveal anything which, in the Applicant's opinion, would remedy the deficiency of the art discussed above as references against the independent claims under consideration herein. Those claims are therefore believed patentable over the art of record.

The other claims under consideration in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

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